
A HRTEM Study of Cronstedtite: Determination of Polytypes and Layer Polarity in Trioctahedral 1:1 Phyllosilicates

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Abstract: It is shown that polytypes or stacking sequences of cronstedtite, an Fe-bearing trioctahedral 1:1 phyllosilicate, can be determined using near-atomic high-resolution transmission electron microscopy (HRTEM). By viewing along the [010], [310] and [310] directions (orthohexagonal indexing), the four groups of the standard polytypes can be distinguished. Imaging along the [100], [110] and [110] directions allows determination of the polytypes in each group. The polytypic sequences of groups A and C are intergrown at the monolayer level in cronstedtite from Lostwithiel, England, which is a new insight if compared with previous suggestions that layer stackings characteristic of different groups do not occur together. The HRTEM images also revealed the relationship between the layer polarity and the morphology of the cronstedtite crystals, where the tetrahedral sheet side points towards the top of the truncated pyramidal shape of the crystal.

Key Words: Cronstedtite • HRTEM • Layer Polarity • Morphology • Polytype • Stacking Disorder • Trioctahedral 1:1 Phyllosilicates

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